Winter 2022
Issue 02

Multiple Sclerosis Research Update

News from the Center for Neuropsychology & Neuroscience Research at Kessler Foundation

In This Issue – Cognitive Disturbances in MS

The Winter edition of the Multiple Sclerosis Research Update focuses on cognitive disturbances associated with multiple sclerosis (MS) and current efforts to remediate these difficulties. Approximately 34% to 65% of individuals with MS have some degree of cognitive impairment.

Difficulties with processing speed (how quickly and efficiently one can process information) and memory are most common. As opposed to dementia, memory impairments do not result in information loss. With MS, memory difficulties arise due to a complication in encoding (or incorporating the information to be remembered into one's memory store).

Researchers at Kessler Foundation have been investigating the nature of these cognitive issues for nearly 30 years. They have used this knowledge to develop effective rehabilitation programs to address the identified cognitive difficulties. In this issue, we report on findings from two cognitive rehabilitation interventions: one aimed at remediating processing speed and the other focused on memory difficulties associated with MS.

Meet the Researcher

Nancy D. Chiaravalloti, PhD, is director of the Centers for Neuropsychology, Neuroscience, and Traumatic Brain Injury Research at Kessler Foundation. She is also a research professor of physical medicine and rehabilitation at Rutgers New Jersey Medical School and a licensed psychologist.

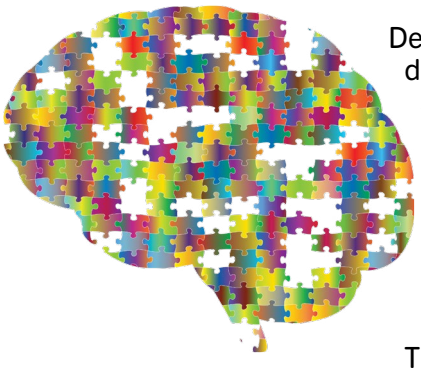
Dr. Chiaravalloti conducts research in cognitive rehabilitation, particularly in new learning, memory, and processing speed. She has led numerous externally funded randomized clinical trials to evaluate the efficacy of cognitive rehabilitation protocols in several clinical populations including multiple sclerosis, traumatic brain injury, spinal cord injury, and mild cognitive impairment. These studies have examined post-treatment changes from multiple vantage points such as objective behavior (with neuropsychological tests), everyday life (with questionnaires and tests of daily life functioning) and at the level of the brain (through functional neuroimaging).

Dr. Chiaravalloti has obtained more than $20 million in grant funding and has published more than 200 peer-reviewed manuscripts, including a book on changes in everyday life following brain injury and illness. She is considered an expert in cognitive rehabilitation in both multiple sclerosis and traumatic brain injury.

The Center for Neuropsychology and Neuroscience Research has been conducting Multiple Sclerosis (MS) research for over 20 years. Impairments in higher level cognitive processing, such as learning and memory, are common symptoms of MS, and negatively impact aspects of everyday life. Scan the QR code or go to https://KesslerFoundation.org/research/multiple-sclerosis-research to learn more about our research.

Research Highlights

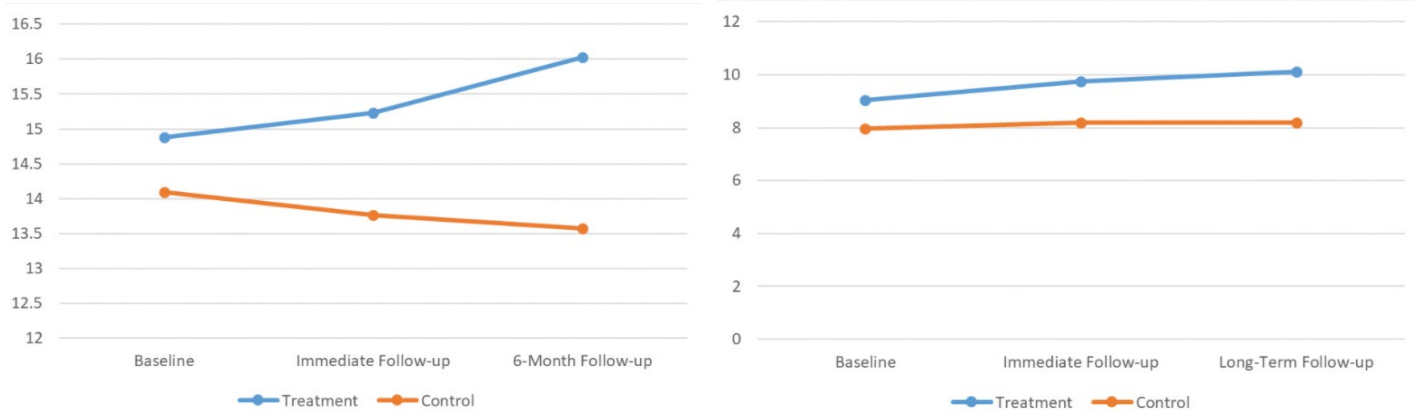
Examining Methods to Treat Processing Speed Deficits in Individuals with MS



Deficits in processing speed have been identified as the most common cognitive deficit in individuals with MS. Processing speed is essential to our daily life functions as information in everyday life is often presented quickly with no option to slow its presentation speed (e.g. driving, watching a movie). A recently completed randomized clinical trial examined the efficacy of a computer-based treatment protocol, "Speed of Processing Training," to improve processing speed in individuals with MS. Among the outcomes were improvements in basic visual processing speed and in neuropsychological evaluations that assessed changes in processing speed ability with paper-and-pencil tests.

The trial included 84 participants with clinically definite MS and impairments in processing speed. There were 43 participants in the treatment group and 41 in the placebo group. Participants underwent a neuropsychological assessment and evaluation of everyday cognitive function at baseline and immediately following the intervention. Long-term follow-up assessments were completed six months after treatment.

A significant effect of Speed of Processing Training was observed on both basic tests of visual processing speed and on neuropsychological measures of processing speed post-treatment. Another important finding was the sustained benefit at the six-month follow up. Significant improvements in processing speed were seen in the treatment group. Moreover, it was found that treatment dosage correlated with the improvements, meaning participants who completed more levels within each training task showed greater benefits. Treated participants who demonstrated improved cognitive performance following the intervention also showed improved performance on measures of everyday life.



The graph on the left shows the performance on pattern comparison by groups. The graph on the right is a letter comparison by groups. The blue lines represent training and show continued increase in benefits for treatment groups over a six-month period. This increase was not seen in the control groups represented by the orange lines.

Sustained Benefits Tracked in 'Speed of Processing Training' vs. Control Groups at Six Months

Findings suggest the Speed of Processing Training is effective for treating deficits and can also have a significant positive effect on everyday life.

–Nancy Chiaravalloti, PhD

To learn more about this research visit: https://link.springer.com/article/10.1007/s00415-022-10980-9

Research Highlights, cont.

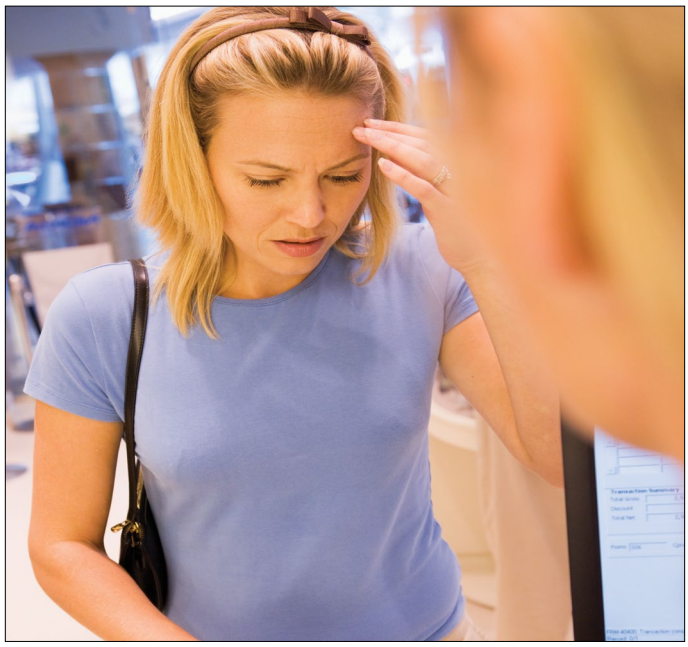
Improving Memory in Individuals with MS through Cognitive Rehabilitation

Memory problems that individuals with multiple sclerosis (MS) experience concern learning new information, not retrieving previously learned information from memory storage. Individuals with MS may have trouble remembering information they need to recollect on a given day, such as an address or a list of items on a shopping list. They may also have difficulty learning and remembering how to do a new task. These examples represent everyday applications of memory abilities.

Nancy Chiaravalloti, PhD, developed the "Kessler Foundation modified Story Memory Technique" (KF-mSMT®) and has been conducting research to examine its efficacy for almost 20 years. The KF-mSMT is a 10-session treatment protocol designed to improve an individual's ability to learn and remember new information through training. The program teaches the individual to use context and imagery to facilitate learning. The last two sessions focus on generalizing these new skills to daily life.

Research examining the KF-mSMT has demonstrated its efficacy across multiple outcomes including objective tests of learning and memory, tasks that assess memory of everyday life activities, and reports of improved memory in daily life by participants and their significant others. In addition, functional MRI before and after KF-mSMT treatment revealed specific changes in patterns of cerebral activation in certain brain regions that are implicated in visual imagery.

Evidence demonstrates that techniques used in the KF-mSMT improve learning and memory performance



in people with MS. It also supports the concept that known deficits in new learning and memory in individuals with MS can be specifically targeted and effectively treated through cognitive rehabilitation.

To learn more about this research visit: https://pubmed.ncbi.nlm.nih.gov/30741103

Clinician's Corner

When to Encourage Individuals to Pursue a Neuropsychological Evaluation

Given what is known about cognitive issues in multiple sclerosis (MS), clinicians may wonder when to encourage individuals to pursue a neuropsychological evaluation and what that entails. When cognitive difficulties begin to interfere with an individual's everyday tasks, especially at work, it may be time for them to consider undergoing an assessment. This is particularly true if others – family members, employers, and friends – begin to notice some cognitive issues emerging during an individual's daily routine.

A full assessment consists of measures of language, attention, memory, processing speed, and executive functions (e.g., planning, reasoning). The assessment often provides a comprehensive picture of any difficulties the patient may be experiencing. Having access to such knowledge can greatly assist the treating physician in determining which areas of cognition need to be addressed and help the patient determine how to maximize their strengths.

A full neuropsychological assessment can also serve as a baseline if provided at the time of diagnosis and be repeated periodically to determine any cognitive decline over time. Considering that cognitive issues are so common in MS, a neuropsychological evaluation should be a part of the dialogue when discussing treatment and care with your patients.

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Clinical Tool Spotlight

Kessler Foundation modified Story Memory Technique

The Kessler Foundation modified Story Memory Technique (KF-mSMT®) is a memory retraining protocol in which participants are taught to facilitate new learning and memory by utilizing context and imagery. The KF-mSMT is delivered in individual treatment sessions with materials presented via computer for ease of administration and scoring. It is also possible to deliver the program remotely.

KF-mSMT provides a minimum of 10 intervention sessions for all participants. Supplementary treatment modules are available for patients who require additional treatment sessions. Sessions last between 30 to 90 minutes. Research protocols suggest scheduling one session twice a week for five weeks. However, the session frequency can be modified to facilitate ease of scheduling.

SCAN ME

The KF-mSMT can be purchased at Kessler Foundation's Learning Center, KFlearn.org. It is available online in English and Spanish.

Now Recruiting

Do you have a patient who is interested in participating in research? Researchers at Kessler Foundation are actively recruiting for the following studies:

- **Eye-movements and Processing Speed in Multiple Sclerosis.** This is a one-visit study that takes approximately three hours to complete. Please refer any individuals with MS between the ages of 30-65 who have never had eye surgery (e.g., LASIK, cataract, laser therapy) and have no significant psychiatric disorders. The first step is a visual screening that takes approximately 15 minutes to complete. The evaluation includes one hour of tests using an eye-tracker and two hours of paper and pencil tests.
- **Memory Rehabilitation in Multiple Sclerosis.** Please refer any individuals between the ages of 18-69 with MS. Potential participants will first undergo a telephone screening by one of our data collectors, which takes approximately 30 minutes. Half of participating individuals will receive a free, paper-and-pencil experimental treatment for memory deficits.
- **Reinventing Yourself with Multiple Sclerosis.** This study consists of a six-week virtual, group intervention that employs cognitive behavioral and positive psychology principles to improve self-efficacy and assist individuals in living well with MS. Please refer any individuals with a definitive diagnosis of MS and no other neurological conditions. Individuals should not be involved in any concurrent formal clinical group or psychotherapy or be experiencing any significant depression.
- **Supervised Exercise and Cognition in Multiple Sclerosis.** This study consists of a 12-week exercise intervention (3 days/week). Eligible individuals should be between the ages of 18-65, right-handed, able to walk without an assistive device (EDSS 0 - 4.0), have no significant psychiatric disorder, on a stable, disease-modifying therapy for at least six months, are relapse-free for 30 days, demonstrate some impairment in processing speed, and have low contraindications for exercise and MRI.

Ask potential participants to contact Nancy Moore at nbmoore@kesslerfoundation.org for more information.